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ABSTRACT

Effects of working with the deep comprehension and decoding activities supported by the software created by Brophy and colleagues to enhance literacy skills in young, at-risk children were studied. Subjects were 53 at-risk kindergartners from a public inner-city school (24 in the control group and 29 in the experimental group). The experimental group used the Multimedia Environments that Organize and Support Text (MOST) environment. This environment involved the subjects' naving half-hour sessions each day on the sequencer and multimedia bookmaker software for about 3 months using the "Miss Emma Anchor" video. At the end of 3 months subjects were given a standardized test (the Metropolitan Readiness Test) and MOST assessments. Children in the experimental group gained more on the auditory and language skills portions of the standardized tests and performed better on the MOST assessments, indicating that the MOST software promotes deep comprehension and aids in development of listening comprehension, story production, and decoding skills. Nine figures illustrate the study, and three appendixes give narrative, episodic, and overall components. (Contains 3 references.) (SLD)

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# Evaluation of Multimedia Instruction on Learning and Transfer

ED 375 166

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Evaluation of Multimedia Instruction on Learning and Transfer

This paper was presented as Part 2 of the symposium, "Effects of multimedia instruction for learning and transfer." The purpose of our study was to measure the effects of working with the "deep comprehension" and decoding activities supported by the software created by Brophy and colleagues (1994) to enhance literacy skills in young, at-risk children. For descriptions of this software see Brophy and colleagues (1994).

The subjects used were 53 at-risk kindergartners from a public inner city school. Twenty-four of the subjects made up the control group, with a mean age of 5 years 11 months; whereas 29 subjects were in the experimental group, with a mean age of 6 years. The control group had a regular classroom environment and the experimental group had the MOST environment. "MOST" stands for "Multimedia environments that Organize and Support Text." This environment involved the subjects having 1/2 hour sessions a day on the sequencer and multimedia bookmaker software for approximately three months using the Miss Emma Anchor video (O'Banion et al., 1994) and other related stories.

At the end of the three months, the subjects were given a standardized test (The Metropolitan Readiness Test) and MOST assessments. MOST assessments were used because in our view the standardized test did not map out everything that was important to us. The MOST assessments included three subtests: Story Production, Decoding Transfer, and Video Comprehension Questions. All of the subjects were given the MRT and the Story Production Assessment as pre- and post-tests, and subsets of subjects were tested on the assessments on Decoding Transfer and Video Comprehension Questions.

**Metropolitan Readiness Test**

The Auditory Skills portion of the MRT measures the child's ability to discriminate among initial sounds in words and to identify letters that correspond to specific sounds in words. As shown in Figure 1, both the experimental and control groups made significant gains on this sub-test from pre-test to post-test, indicating that both groups had gained skills in this area during the school year. However, children in the experimental group appeared to gain greater skills than children in the control group.

There was no significant difference between the performance of the control and experimental groups at pre-test ($t(51)= 1.01$, $SE=9.83$, $p<.10$), but the experimental group outperformed the control group at post-test ($t(51) = 2.58$, $SE=10.488$, $p<.05$).

The Language Skills portion of the MRT measures basic cognitive concepts listening comprehension, and the results for this sub-test are shown in Figure 2. Once again, children in the experimental group appeared to gain greater skills in this area than children in the control group. In fact, only the experimental group showed a significant increase from pre-test to post-test. A t-test showed no significant difference between the groups at pre-test but a significant advantage for experimental group over the control group at post-test ($t(51) = 2.95$, $SE=8.66$, $p<.01$).

**MOST Assessments**

**Story Production.** The Story Production Assessment was based on a test used by Shapiro and Hudson (1991). This assessment examines the student's ability to construct stories from picture sequences of familiar events. Subjects were given pictures to form a coherent story and were asked by the experimenter to "tell a story that goes with the pictures." An analysis was done on 12 categories of the subjects' stories (see Appendixes A, B, and C for a complete list). These categories are make up three components: Basic Narrative, Episodic, and Overall. The Basic Narrative components are the minimal requirements of a narrative; the Episodic components are categories essential for plot development; and the Overall components are categories that can be found in both the Basic Narrative and Episodic Components.

A t-test showed no significant differences in the presence of the 12 categories in the narratives of the control and experimental groups at pre-test. However, as shown in Figure 3, the experimental group used more Actions ($t(46) = 2.47$, $SE=.605$, $p<.05$), Obstacles ($t(28) = 3.55$, $SE=.094$, $p<.01$), Propositions ($t(51)=3.98$, $SE= .92$, $p<.01$), Tense $t(51)=3.20$, $SE=.095$, $p<.01$, and Narrative Level $t(51)=4.84$, $SE=.208$, $p<.01$) in their narratives at post-test than did the control group. There were no other significant differences between the two groups at post-test. However, further analyses showed that whereas the control group made no significant gains from pre-test to post-test on any other categories, the

experimental group showed an increase from pre-test to post-test on the following categories: Propositions ($t(28) = 2.65$, SE=1.053, $p<.05$), Tense ($t(28) = 5.02$, SE=.078, $p<.01$), Actions ($t(28) = 2.37$, SE=.641, $p<.05$), and Narrative Level ($t(28) = 2.49$, SE=.236, $p<.05$). Figures 4-7 display a summary of these results.

**Decoding Transfer.** This test was administered on the computer with software modelled on a program that children in the experimental group had used as part of the MOST environment. The software displayed a book on the screen, and buttons allowed the children to hear the sentences on the page read aloud, with phrases visually highlighted as they were read. One of the words on the page was visually missing on the page (there was a blank for it in the sentence). Children listened to the sentence read; then chose from three alternatives the written form of the word to go in the blank. Observations showed that children in both the experimental and control groups understood the task of the program and could manipulate the features easily. The test measure was a new story that included both old words from previous software stories and new words that had not appeared in any previous stories.

The computer recorded the choices that children made to fill in the blank on each page. The results indicated that the experimental group was significantly more accurate in their choices than the control group ($t(9) = 3.78$, SE= 9.564, $p<.01$). Figure 8 shows the ranked individual subjects scores on this test in descending order. Most of the experimental subjects scored between 80 and 100 percent correct. Although two control subjects scored from 75 to 100% correct, the rest scored below 50% correct.

**Video Comprehension Questions.** A major purpose of the software used in the MOST environment was to promote deep comprehension of the video anchor story that was used as a basis for the software activities. This video story, The Miss Emma Story, was about 15 minutes in length. To assess comprehension of the story, twelve experimental subjects were given literal and inference questions used in a previous study by O'Banion and colleagues (1994). In that previous study, at-risk kindergarten children who watched the video without using the MOST software activities scored a mean of 62% correct. In contrast, the children in the experimental group for this study scored a mean of 91% correct,

indicating that the MOST software activities had successfully allowed the children to deeply comprehend the video story, as shown in Figure 9.

## Summary

The question guiding our study was "Does the MOST software significantly promote deep comprehension of a video story and aid in the development of listening comprehension, story production, and decoding skills?" The results presented here indicate that the answer to this question is "yes."

It is important that we obtained this result after working with the children for only three months. We are optimistic that over a longer time frame we will see even greater literacy gains made by children using the MOST software. At present, the children in this study are completing an additional year of work in the MOST environment, and we are administering assessments similar to the ones described in this paper, as well as a few new assessments, in order to measure their progress.

## References

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O'Banion, K., Sharp, D., Goldman, S., Mayfield-Stewart, C., Boylin, M., Ives, K., Bransford, J., Kinzer, C.K., & Risko, V. (1994). Effects of multimedia materials on learning and long-term retention. Paper presented at the 1994 American Education Research Association Annual Meeting in New Orleans, LA.

Shapiro, L.R. & Hudson, J.A. (1991). Tell me a Make-Believe Story: Coherence and Cohesion in Young Children's Picture-Elicited Narratives. Developmental Psychology, 27 (6), 960-974.

Fig.1

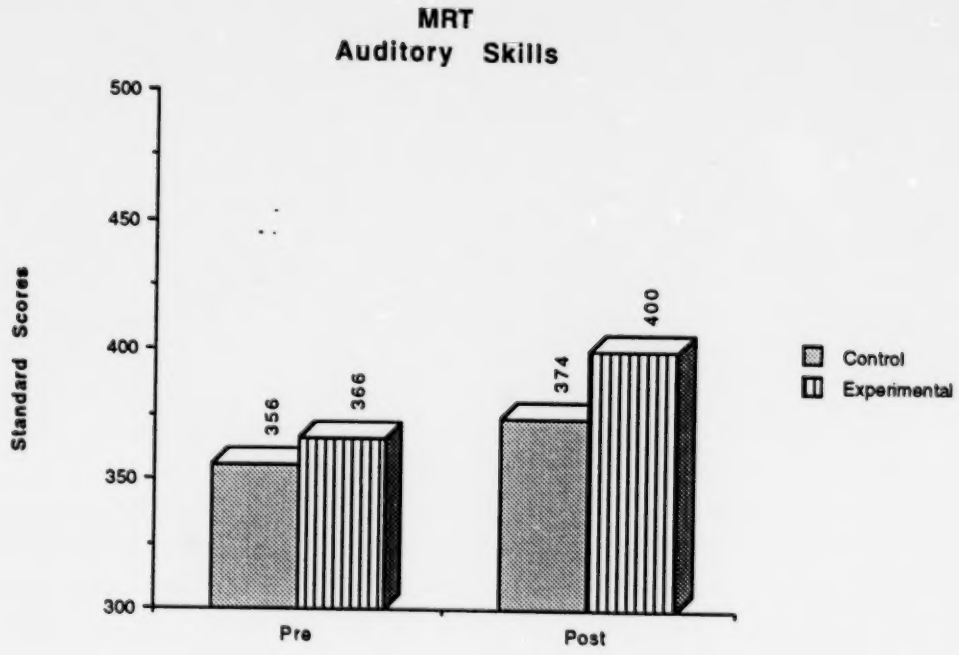

MRT
Auditory Skills
Standard Scores
500
450
400
350
300
356
366
374
400
Pre
Post
Control
Experimental

Fig.2

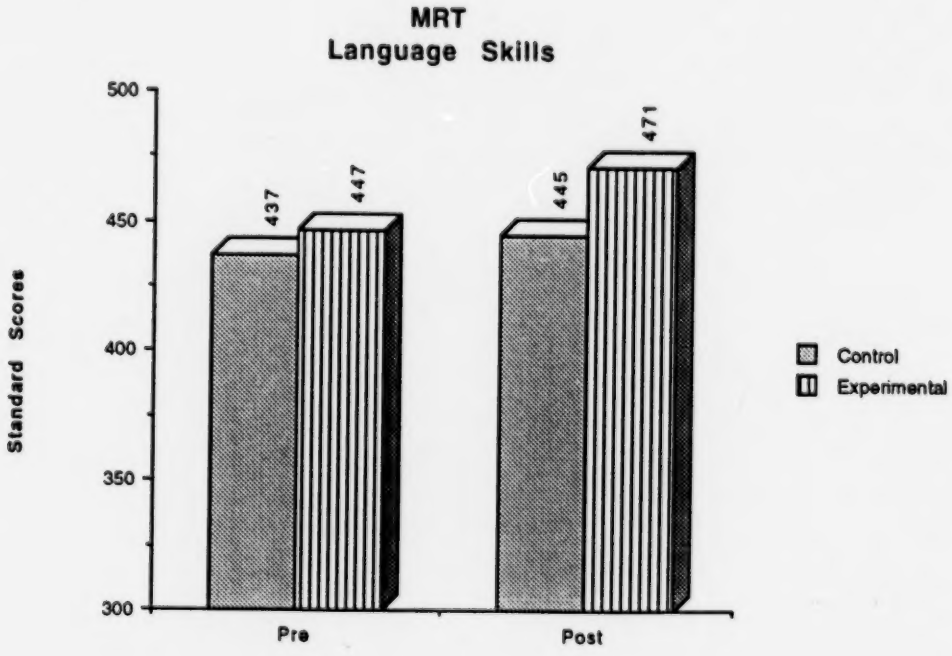

MRT
Language Skills
Standard Scores
500
450
400
350
300
437
447
445
471
Pre
Post
Control
Experimental

Figure 3

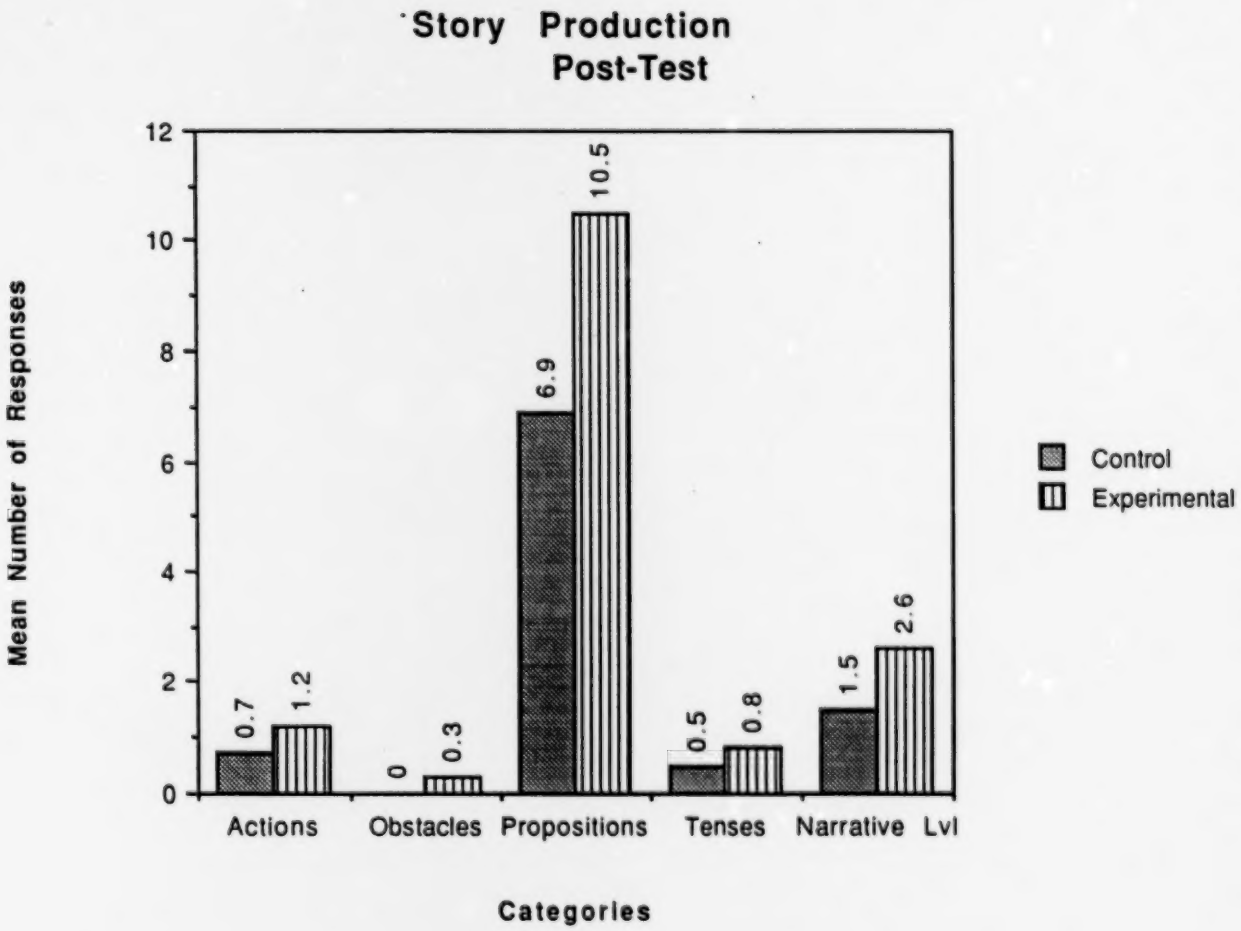

Story Production
Post-Test
Mean Number of Responses
12
10
8
6
4
2
0
0.7
1.2
0
0.3
6.9
10.5
0.5
0.8
1.5
2.6
Actions
Obstacles
Propositions
Tenses
Narrative Lvl
Categories
Control
Experimental

Figure 4

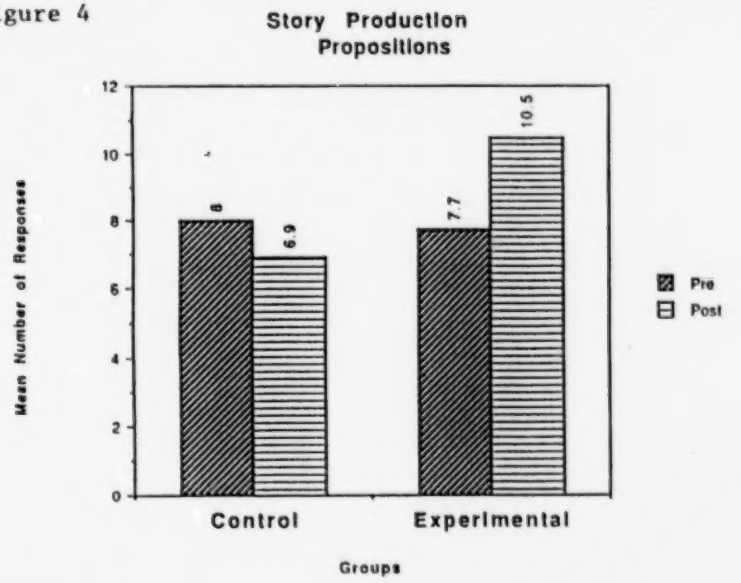



Figure 5

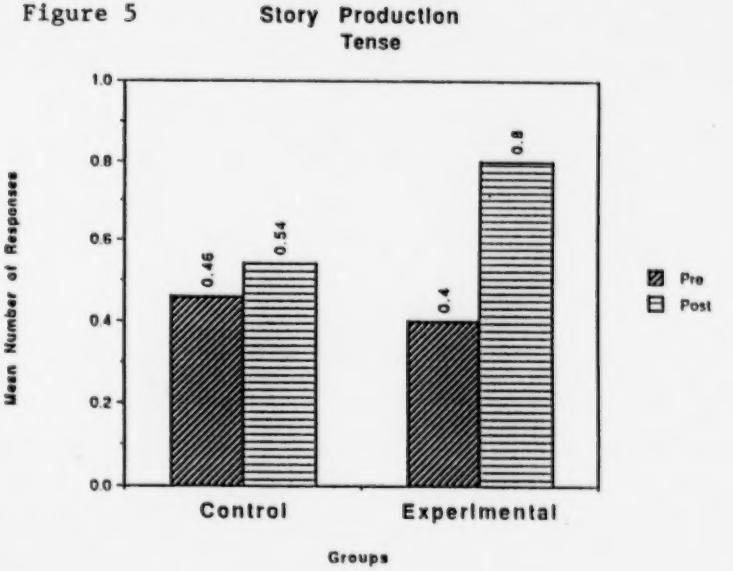



Figure 6

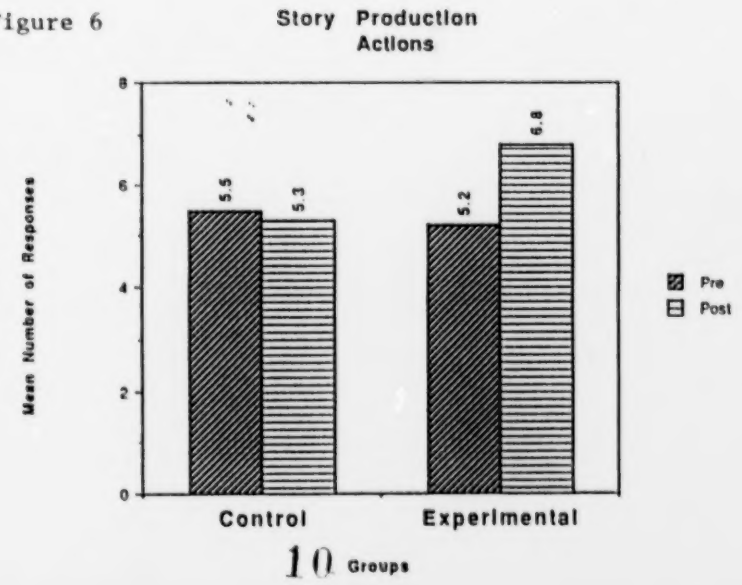



Figure 7

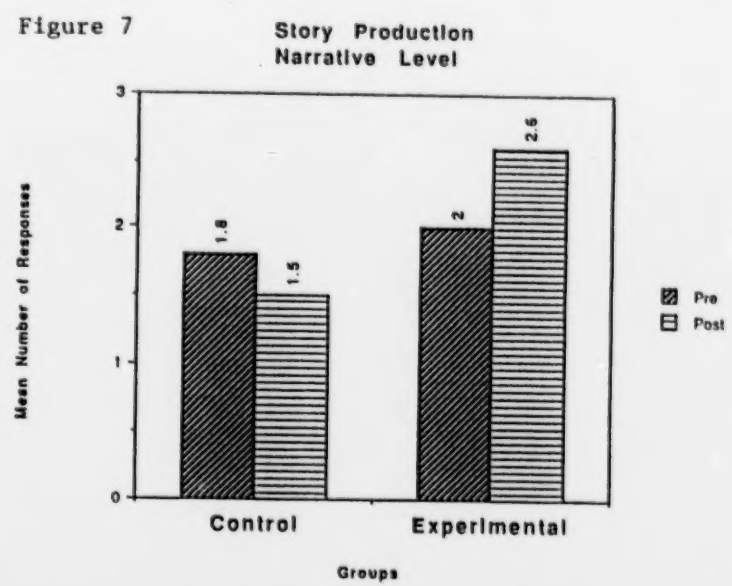


Figure 8

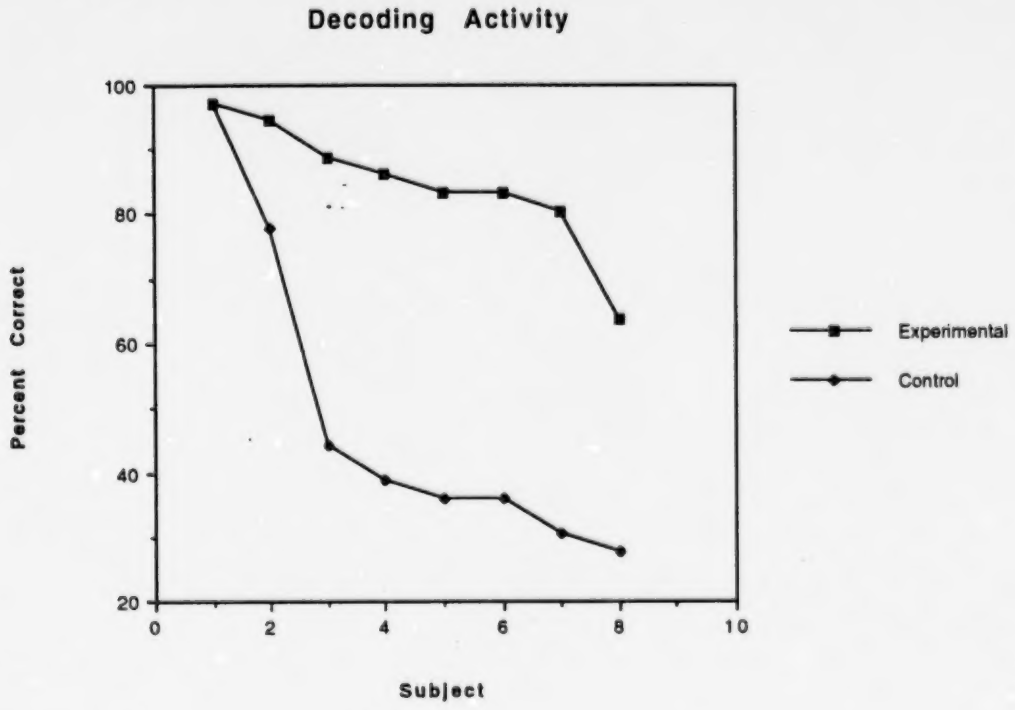
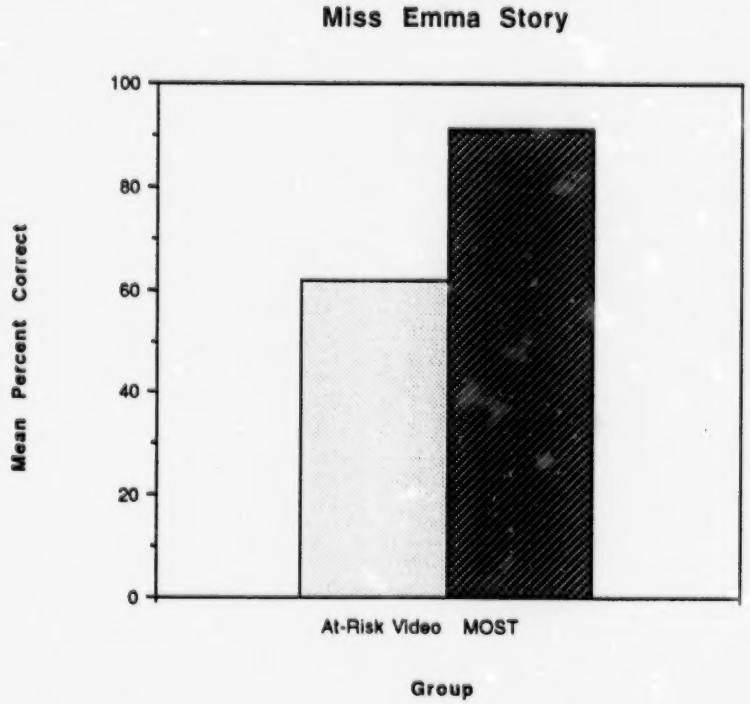



Figure 9



Appendix A Basic narrative components

| Categories | Definition |
|---|---|
| Story beginnings and endings | Traditional fairytale openings and closings (e.g., "Once upon a time ... Happily ever after) and "moral" endings (e.g. so that will never happen again) |
| Orientation settings | Information about the locale (e.g., "they were at a park" or "Tennessee"), background (e.g., "the cookies were gingerbread men"), time frame (e.g., "it was summer"), and explanations (e.g., "cause the cookies burned") |
| Character descriptions | Introductions (e.g., "There was a girl and her mom") and information describing characters (e.g., names, physical appearance, and social role) |
| Dialogue | Conversations between characters in the form of quoted speech (e.g., he said, "Let's go") or as indirect statements (e.g., "He told her that ..") |
| Actions | Events describing action sequences (e.g., "She's cooking" or "She's making cookies), not including obstacles and repairs or characters' attempts to achieve a goal |

Appendix B Episodic Components

| Categories | Definition |
|---|---|
| Goals | Statements of character's purpose, plans, or intentions (e.g. "He wanted to go swimming) |
| Internal responses | References to characters' thoughts and emotions (e.g., "She was sad") and responses by the character to the attainment or nonattainment of the goal (e.g., "Then she was happy" or "He cried") |
| Obstacles | Events that interrupt action and include an unexpected result or problem (e.g., "The cookies got burned" or "They forgot their towel at the beach") |
| Repairs | Attempts by the characters to rectify obstacles (e.g., "So they went to the store to buy new cookies" or "They returned to the beach for their towel") |

Appendix C Overall Components

| Categories | Definition |
|---|---|
| Propositions | The number of statements with a subject and a predicate |
| Tense | Ratio of usage of past tense |
| Narrative Level | Degree to which children's stories incorporated episodic components |
| | 1) actions, orientation information or both |
| | 2) one episodic component |
| | 3) two episodic components |
| | 4) three or more episodic components |